

## CLAIMS

1. A process for the exothermic generation of syngas by the partial oxidation of a hydrocarbon-containing fuel comprising:

5 (i) reacting the hydrocarbon-containing fuel with an oxygen containing gas in a first reactor to produce the syngas and byproducts comprising CO<sub>2</sub>, H<sub>2</sub>O and soot; and

(ii) introducing the syngas and byproducts into a second reactor containing a non-carbonaceous material that traps the soot for a sufficient time such that the majority of the byproduct soot is gasified via reaction with the byproduct CO<sub>2</sub> and/or H<sub>2</sub>O to produce a syngas stream that is depleted in the soot.

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2. The process of Claim 1 which further comprises:

(iii) recovering a portion of the heat from the soot depleted syngas stream and using at least a portion of the recovered heat to facilitate the additional production of syngas via the (endothermic) catalytic reforming of natural gas and steam.

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3. The process of Claim 1 wherein substantially all of the byproduct soot is gasified in step (ii).

20 4. The process of Claim 1 wherein the non-carbonaceous material comprises alumina.

5. The process of Claim 1 wherein the non-carbonaceous material contained in the second reactor is in the form of spherical particles.

25 6. The process of Claim 1 wherein the non-carbonaceous material contained in the second reactor is in the form of rings.

7. The process of Claim 1 wherein the non-carbonaceous material contained in the second reactor has a catalytic functionality to facilitate the gasification of the soot.

8. The process of Claim 1 wherein first and second reactors are operated in a temperature range from 2100F to 2800F.

5           9. The process of Claim 1 wherein a fluid is added to the syngas and byproducts produced by the first reactor prior to introducing the syngas and byproducts into the second reactor.

10           10. In an apparatus for the exothermic generation of syngas by the partial oxidation of a hydrocarbon-containing fuel comprising:

(i) a first reactor for reacting the hydrocarbon-containing fuel with an oxygen containing gas to produce the syngas and byproducts comprising CO<sub>2</sub>, H<sub>2</sub>O and soot; and

15           (ii) a second reactor for receiving the syngas and byproducts containing a non-carbonaceous material that traps the soot for a sufficient time such that the majority of the byproduct soot is gasified via reaction with the byproduct CO<sub>2</sub> and/or H<sub>2</sub>O to produce a syngas stream that is depleted in the soot.

11. The apparatus of Claim 10 which further comprises:

20           (iii) a heat exchange reformer for recovering a portion of the heat from the soot depleted syngas stream and using at least a portion of the recovered heat to facilitate the additional production of syngas via the (endothermic) catalytic reforming of natural gas and steam.

25           12. The apparatus of Claim 10 wherein substantially all of the byproduct soot is gasified in the second reactor.

13. The apparatus of Claim 10 wherein the non-carbonaceous material comprises alumina.

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14. The apparatus of Claim 10 wherein the non-carbonaceous material contained in the second reactor is in the form of spherical particles.

5 15. The apparatus of Claim 10 wherein the non-carbonaceous material contained in the second reactor is in the form of rings.

16. The apparatus of Claim 10 wherein the non-carbonaceous material contained in the second reactor has a catalytic functionality to facilitate the gasification of the soot.

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17. The apparatus of Claim 10 wherein first and second reactors are operated in a temperature range from 2100F to 2800F.

15 18. The apparatus of Claim 10 further comprising a means to add a fluid to the syngas and byproducts produced by the first reactor prior to the second reactor receiving the syngas and byproducts.

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